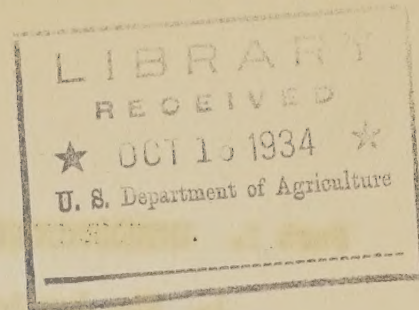


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UNITED STATES DEPARTMENT OF AGRICULTURE
GRADUATE SCHOOL

RECENT DEVELOPMENTS IN ECONOMIC THEORY

- Part I. Introductory
- Part II. The theory of perfect competition.
- Part III. The theory of imperfect competition and monopoly.
- Part IV. The theory of monetary disturbances with special reference to the business cycle.
- Part V. The theory of international trade and international payments.

Part I. INTRODUCTORY.

1. The development of economic theory.---The main part of economic theory has been developed through attempts to explain by deductive methods the behavior of prices in a capitalistic economy. Two aspects of this problem which have, until recently, been kept quite separate in theoretical discussions are: (1) the determination of the absolute level of all prices in terms of money, i.e., the general price level, and (2) the determination of the relative prices of particular commodities.

The first of these two sub-problems has been traditionally dealt with in a rather superficial way by the quantity theory of money which in its essentials dates back to the 18th century, and which has thrown some light on certain particular economic phenomena such as those of international exchange and those of extreme inflation.

The theory dealing with the second aspect has been broader in its applications, and has attempted to explain the way in which production, consumption and the distribution of incomes affect and are affected by the relationships between prices. This theory has traditionally been based on the doctrine of economic equilibrium, according to which prices, production and the other variables in the economic systems are constantly tending towards an equilibrium level which is determined by: (1) the technical conditions of production; and (2) the choices of individuals as between (a) the purchase of different consumption goods, (b) work and leisure and (c) consumption and saving. These fundamental conditions have been thought to influence the variables in such a way that if the latter were ever finally to reach equilibrium they would not move away from it

unless the fundamental conditions were changed. It is in this sense that the equilibrium has been regarded as stable. According to this view any actual instability in the variables is attributed to changes in the fundamental conditions.

Essentially this type of economic theory is a theory of individual choices.

Its conclusions have been deduced from assumptions which all economic theorists have realized not to be entirely true, although some have thought them either approximately true or at least possible under the capitalist system. The main assumptions are: (1) that individuals are activated by the profit motive and act rationally (within the limits of their technical knowledge) in those of their activities which are concerned with business or with earning a living; (2) that they possess perfect knowledge of market conditions and prospects; and (3) that the existence of monopolistic price fixing and other influences tending to reduce the effectiveness of competition is of minor importance.

This type of economic theory, with its high degree of abstraction and its oversimplified view of our economic system as one in which all the variables are constantly moving towards an equilibrium as water seeks its own level, is the work of the neo-classic economists (this term is here applied not only to the Marshallian or Cambridge School, but also to the Mathematical or Lausaune and the Austrian Schools of economic thought) who developed it during the late 19th and early 20th centuries. It is derived in part from the theories of Adam Smith and David Ricardo. Neo-classical economic theory has been severely criticized for its use of the method of making deductions from a few simple assumptions. Critics have

in the main proposed two approaches as a substitute for or supplement to the deductive method: (a) a study of economic institutions in their sociological and historical setting, and (b) statistical analysis of trends and correlations. The difficulties of reconciling the results of statistical analysis with a view which emphasizes the importance of changing institutions have not always been fully realized. But there can be no doubt that a combination of deductive, institutional and statistical analysis is necessary to a full understanding of the way in which the capitalist system or any other economic system works.

But in order to make the best use of the deductive method it is necessary to expand its basic assumptions beyond the simple ones outlined above. Considerable progress in this direction has been made in the work of economic theorists during the past few years. Until very recently the theory of monopoly was treated as an isolated problem, but in the past few years the effects of monopolistic influences on our whole price structure have received considerable attention. This in itself might almost be described as a revolution in the theory of prices.

A similar revolution is taking place in monetary theory. Before the present decade the only type of monetary theory generally known in the English-speaking countries consisted of the addition of a few refinements to the quantity theory of the 18th century. This theory was not organically related to the theory of the relative level of particular prices. The quantity theory of money, for instance, does not explain why, in periods of deflation, the demand for capital goods falls off more rapidly than that for consumers' goods. Nor does it explain the influence which a change in the relative prices of consumers' and capital goods

may have on the general price level. Moreover, the quantity theory of money is essentially one of stable equilibrium. It has recently been shown, however, that the business cycle cannot be explained in terms of any theory of stable equilibrium. Modern monetary theory, in analysing the interactions between the absolute level of all prices and the relative level of particular prices has already thrown some light on the sources of instability in our economic system. Moreover, some economists have sought at least a partial explanation of the business cycle in a modification of the assumption that all producers and consumers have perfect knowledge of market conditions and prospects (a modification that is essential to the explanation of such phenomena as cycles in livestock prices and production.)

Finally, the theory of international payments has recently undergone some modifications which are related to recent developments in monetary theory.

2. The nature of deductive economic theory.---Economic theory does not deal with facts, but with the conclusions which may be deduced from certain assumptions. If the assumptions are facts and the reasoning correct, the conclusions must be facts. If the conclusions are not facts, not all of the assumptions can be facts. The recent developments of economic theory described above have attempted to make it more useful in helping to explain how our economic system works by bringing the assumptions nearer to reality. This has tended to make the logical analysis more complicated and has increased the need for precision. The use of elementary mathematical concepts has become essential and

that of more complicated mathematical analysis increasingly fruitful.

The newer developments are mainly an elaboration and extension of the older theories, and the latter must be understood in order to understand the former. Moreover, the recent developments have been made possible largely through a more precise and rigorous statement of the results of the older theories than is to be found in many standard works on economic theory.

The first semester will be mainly devoted to a study of the way in which the relative prices and the other economic variables which interact with prices would behave under perfect competition. Perfect competition implies two assumptions: (1) perfect knowledge of market conditions and prospects on the part of producers and consumers, and (2) complete absence of monopoly. The latter means that (a) producers of any commodity do not combine in order to fix prices or production, the same being also true of consumers, and (b) every producer of any particular commodity produces so small a part of its total output in a particular market that the effect on price of any change which he may make in his production is negligible and that he therefore takes the market price for granted without attempting to influence it, the same being also true of consumers. These assumptions are mainly adhered to in Part II of this course, although the assumption of perfect knowledge is modified in parts of Sections D and E.

A further assumption which is mainly adhered to in Parts II and III is that trade takes place on a barter basis (some particular commodity being used as a unit of account but not as a means of payment.) The results of the use of money as a means of payment are analysed in Parts IV and V.

The theory of perfect competition represents a first approximation to reality which is misleading if applied to reality in its unmodified form,

but is useful as a starting point for the development of further approximations.

The theory of perfect competition, however, has another use. It throws light on the way in which an economic system could be planned in order to secure the greatest amount of real income for consumers. It will be seen, particularly in the discussion of monopoly, that a planned economy in which competition played a much less important part than it does in our present system might behave more like a perfect competitive system than our present system does. Perfect competition must be distinguished from the results of laissez-faire, which in our present society are apt to involve an important element of monopoly and serious monetary disturbances.

Readings

1. Knight, F. H. Risk, Uncertainty and Profit, Chapter I, Pages 3-21.
2. Robbins, L., The Nature and Significance of Economic Science, pages 1-18, 45-95.

Robbins is a vigorous advocate of deductive economic theory, for which he claims more than others do who still find it useful.

3. Fraser, L. M., How do we want economists to behave? In Economic Journal, December 1932.

A criticism of Robbins.

4. Sraffa, P., The Laws of Return under Competitive Conditions. In Economic Journal, December 1926.

This article is a landmark in the recent history of economic theory. It points out that the theory of perfect competition is inadequate for analysing our present economic system, and a theory of imperfect competition is required. That the latter has since been developed is partly due to the article itself.

A. The theory of choice as applied to problems of production and demand.

1. The process of production and the principle of substitution.--

The principles of choice which underlie the whole of economic theory are exemplified in their simplest form by analysing the relation of the prices of materials and resources (land, labor, etc.) to their use by an individual producing a particular commodity for sale and possessing a given, limited knowledge of the technique of production. It is a fact ascertained by observation that in most cases a commodity can be produced with varying proportions of the different materials and resources entering into its production. The amounts of the various resources^{1/} used by a rational producer will depend on their prices. If the price of one resource falls, its use will increase relatively to the use of the other resources, and thus the proportions will be varied. This is the principle of substitution.

If the quantity utilized per unit of time (input) of one resource is increased by successive additions of equal amount, while the inputs of the rest are held constant, then each successive increment of the varied resource makes a smaller addition to the total product than did the preceding increment. This again is a fact ascertained by observation. The additional physical product derived from an addition to the input of a resource (when the inputs of the rest are held constant) is known as the marginal Physical productivity, of that resource; the additional value product derived in the same manner is known as marginal value productivity, or simply marginal productivity. Using these definitions, the first sentence in this paragraph may be re-stated by saying that when the input of one resource is increased (other inputs remaining unchanged) the marginal productivity (both physical

^{1/} The word "resource" is used here and in the following pages to include both materials and primary resources.

and value) decreases. This is the law of diminishing returns. With rational production the utilization of each resource will be pushed up to the point where its marginal productivity equals its price. The marginal physical productivities of the various resources will then be proportionate to their prices.

The same relationships can be looked at another way. If the input of one resource is reduced, it is possible, at least within certain limits, to keep the output of product from being reduced by increasing the input or inputs of one or more of the other resources. If the inputs of resources A and B are varied, while the inputs of all other resources and the output of product are held constant, then a certain increase in the input of B will be required to compensate for a decrease of one unit^{1/} of the input of A. This increase in the input of B is the marginal rate of substitution of B for A. As the input of A decreases and that of B increases, the marginal rate of substitution is increased also. A rational producer will make the inputs of A and B such that the marginal rate of substitution of B for A is equal to the ratio of the price of A to the price of B.

Finally, we must consider the relation between the price of the product and the cost of the resources used in its production. This determines the profit made by the producer and hence also the total quantity of the product produced by all producers. If the price of the product is sufficiently high relative to the prices of the materials and resources the total value of the output will exceed its cost of production (inclusive of "normal profit") and there will be a pure profit. This will cause the total output of all producers of the product in question to increase, causing its price to fall

^{1/} The size of the unit is of course chosen arbitrarily but must be small in relation to the total input in order to get a result which approximately describes the effect of continuous variation.

(and also causing the prices of the materials and resources to rise) until the pure profit has disappeared. We thus obtain the groundwork for a theory of the demand for producers goods, which, to be complete, must also include a theory of the demand for the product, which means the demand for consumers' goods.

Readings

1. Marshall, Alfred. Principles of Economics, Eighth Edition, pages 355 to 359 and 404-406.

The principle of substitution and its relation to other principles of rational choice are explained.

2. Black, J. D. Introduction to Production Economics, pages 275-346.

Explains some of the technicalities, with excellent illustrations.

3. Clark, J. M. Economics of Overhead Costs, pages 70-103.

2. The demand for consumers' goods.--The theory of the demand for consumers' goods is similar to the partial theory of the demand for producers goods referred to above, but a little more difficult to understand as it deals with something less tangible. According to the older theory, the consumer tends to choose that combination of goods for consumption which, with a given set of relative prices, will make his total utility, or satisfaction, as large as possible, just as a rational producer will choose that combination of materials and resources which with a given set of prices will give him the largest output for the amount of money spent. More recently, however, it has been shown that we can re-state the whole theory of demand without referring to utility and without making certain questionable assumptions as to the rationality of the consumer which the use of that concept implies. According to the older theory the proportions between the marginal

utilities of goods purchased by a consumer are equal to the proportions between the prices he has to pay for them. According to the new theory, the consumer's marginal rates of substitution^{1/} are equal to the relative prices of the goods.

In analysing the way in which the purchases of a commodity by a consumer are influenced by (a) the consumer's income, and (b) the prices of all consumers' goods, the significance of income-elasticity of demand and price-elasticity of demand will be explained. Price relationships between complementary and competing goods will also be considered.

Readings

1. Marshall, Principles, Eighth Edition, pages 92-119.

Utility theory with certain complications ignored. Definition of price elasticity of demand.

2. Davenport, H. J., Economics of Enterprise, pages 64-87.
3. Schultz, Henry. Statistical Laws of Demand and Supply, pages 3-27.

Definition of price elasticity of demand.

4. Hicks, J. R. A reconsideration of the theory of value to Economics, February, 1934.

The new theory of demand. Definition of income elasticity of demand. Discussion of competitive and complementary relations between individual commodities.

3. A first approximation to the theory of economic equilibrium.--

By developing the implications of the theory of demand, we can deduce a theory of the determination of prices in a closed economic system under simplified conditions, assuming (among other things) that competition is everywhere perfect, that producers act rationally within the limitations of their technical

^{1/} The meaning of this phrase in connection with the demand for consumers' goods will be explained in class.

knowledge, and that the supplies of primary resources (traditionally comprised in the three categories of land, labor and capital) are fixed. It can then be shown that the relative prices of all commodities, the outputs of all commodities other than primary resources, and the incomes of all individuals are determined by the following conditions:

(1) The income per unit of time of each individual is equal to the value (i.e. quantity X price) of the services per unit of time of primary resources owned by him.

(2) The quantity of each consumers' goods purchased and consumed per unit of time by each individual is determined by his income and by the prices of the various consumers' goods. This is merely a statement of the theory of demand. The tastes and preferences which determine the way in which consumption is affected by income and prices are assumed given.

(3) The price of each consumers' goods is equal to its cost of production (see above, under II, A, 1).

(4) The quantity of each resource and producers' goods used per unit of time in the making of each product is determined by the prices of the resources and producers' goods.

(5) Competition drives the prices of primary resources to that level which will cause the whole available supply (per unit of time) of each to be used, and the prices of other goods to the level at which the quantity produced per unit of time equals the quantity purchased and used in production or consumed per unit of time. In our "first approximation" unemployment and surplus stocks of commodities do not exist.

Here the incomes of individuals are seen to be determined by the conditions of ownership of the primary resources and by the marginal productivities of their services. The former is an institutional element which has not been given sufficient attention in some expositions of the theory of distribution.

Another aspect which until very recently has been neglected is the way in which monopolistic competition modifies the effect of marginal productivity on income, but this will be considered at a later stage. Finally, unemployment and taxation are two further factors (to be considered later) which make the distribution of income in the real world differ from that which would exist under the hypothetical conditions of our first approximation.

Different modifications would have to be made in applying our results to the problems of a planned economic system. But the results of our present theoretical analysis, based on the assumption of perfect competition, might conceivably differ less from the facts of a planned economy than they do from those of our present imperfectly competitive economic system.

Readings

1. Cassel, Gustav. Theory of Social Economy, pages 134-155.
2. Ohlin, Bertil, Interregional and International Trade, pages 553-556.

B. The Theory of Cost and Supply.

The elementary conception of cost used in the preceding analysis needs to be modified in order to analyse the effects of changes in the supplies of primary resources which arise in response to changes in their prices, and to be further developed in order to analyse changes in the production of commodities which arise in response to changes in demand.

1. The concept of opportunity-cost and the primary resources.---Under the conditions of our first approximation, 3) where the supplies of all primary resources are fixed any one commodity can be increased only by transferring production from the production of other commodities, and so

of the latter. Hence the cost (in a social sense) of producing one commodity is in reality the unused opportunity of producing others. Moreover, the producers of one commodity compete for the resources they use with the producers of other commodities; the producers of commodity A must pay for the services of a particular kind of resource as much as the owners of the resource could get from the producers of commodity B, which under given technical conditions depends on the demand for commodity, B. Hence under the conditions of our first approximation, the expenses of production of one commodity are in the last analysis, determined by the demand for other commodities. This result is basic for the theory of cost, but requires modification before it can be applied to the problems of the real world.

The first modification results from the fact that in the real world the supplies of primary resources are not absolutely fixed. If the producers of commodity A bid up the price of unskilled labor in their efforts to obtain more of it, so that real wages rise, the total supply of unskilled labor may increase because laborers are willing to work more or harder for higher wages. On the other hand, they may prefer to do less work. In either case the demand for commodities other than A will not be the only determinant of the cost of A. Similarly a rise or fall in the rate of interest will influence the amount of saving and hence, (but only in the long run) the total supply of capital; (for the application of the opportunity cost concept to the theory of capital and interest - see below, II, D.) Hence the equilibrium of prices and production is determined, even technical conditions, not only by the relative tastes of consumers for different consumers' goods, but also by their consumption, work and saving.

for and against allowing the economic system to be regulated in this way will be discussed at this point. One

of the most important advantages of the opportunity-cost concept is that it raises fundamental problems of social policy connected with economic planning. The influence of the conditions of ownership of the primary resources and of the existence of imperfect competition will of course need to be considered.

Another important modification of our results arises from the existence of imperfect competition and monetary disturbances and will not be analysed at this stage. In the real world the producers of commodity A may obtain more labor simply by giving jobs to the unemployed, which will involve no reduction in the outputs of other commodities and in spite of this, something will be paid for the labor. In the long run, however, the wages that the producers of A must pay will be greatly influenced by the opportunities available for workers in alternative employments.

Readings

1. Davenport, H. J. Economics of Enterprise, pages 57-84.
2. Knight, F. H. Risk Uncertainty and Profit, pages 51-93.
3. Knight, F. H. Suggestions for a simplification of the theory of price. In Journal of Political Economy, 1928.
Statements of the opportunity-cost theory.
4. Marshall, Principles, pages 140-143 and 331-350.
Represents a different point of view, Marshall conceived of cost as due fundamentally to the disutility of work (pain-cost). This is connected with his views on rent and diminishing returns in agriculture.
5. Clark, J. M. Economics of Overhead Costs, pages 1-69.
Raises some problems which are outside of the theory of perfect competition.

2. Marginal cost as a determinant of price--Long and short run Supply Curves--Rent and Quasi-rent.--Suppose that the output of commodity A is increased by one unit. What is paid for the additional resources required to produce the additional unit is known as marginal cost. The price of A must be equal to that

marginal cost to evoke the production of the additional unit. Hence marginal cost is also supply price. If output is increased by a second additional unit, the marginal cost may not be the same for the second increment as it was for the first. In general it will be greater for the second, since those resources which the A industry uses in larger quantity (relative to other resources) than do other industries will become more scarce and hence more costly. Hence marginal cost and supply price vary with output, and on this result the concept of a supply curve is based. If a resource is used only in the production of A (that is to say, if it is specialized in the production of A), its price will not enter into marginal cost^{1/}, will form a residual element of total cost which does not influence price, and will be determined in such a way that average cost equals marginal cost^{2/}. The Ricardian theory of rent was built up by regarding land as a specialized resource used only in the production of agricultural products which were treated as one commodity. When increased supplies of the non-specialized resources are obtained from other industries, but increased supplies of the specialized resource are not, the former are used less efficiently^{3/} with every increase in output; this is an additional factor causing supply prices to rise. In the long run, few resources are specialized, but in the short run many forms of productive equipment are specialized. Hence the elasticity of supply is in general greater the longer the period in question. The earnings of resources which are specialized for the period in question but

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- 1/ Since none of it is used in the production of other commodities, either no additional supplies of it can be obtained, or if they can be, this means that not having been previously used for a productive purpose they cost nothing and are a free good (e.g. the nitrogen in the air.)
- 2/ The last point is explained in Viner's article, assigned below for reading.
- 3/ They will be used less efficiently if no additional supplies of the specialized resource are available owing to the operation of the law of diminishing returns. They will also be used less efficiently if the additional supplies of the specialized resource are of poorer quality than those already in use.

not permanently are known as quasi-rent. The relations of marginal, average and total cost, of fixed (overhead) and variable cost and of these to supply price, both to a whole industry and to an individual producer will be analysed in detail. Ambiguities involved in the concept of a supply curve will be considered.

Readings

1. Viner, Jacob. Cost curves and supply curves. (photostat copies in Graduate School Collection.)

Explains the relation of cost curves to supply. The detailed precision of this modern treatment contrasts with the looser statements in Marshall.

2. Marshall, Principles, pages 150-172 and 413-439 with pages 440-454 optional.

Explains the Ricardian theory of rent and Marshall's concept of quasi-rent which is derived from it. Marshall's view that diminishing returns in agriculture have a different significance from diminishing returns in the generalized sense is no longer widely accepted. Read carefully the note on pages 169-172 and the footnote on pages 436 and 437. "Rent" in modern economics is payment for the use of a resource which is specialized to one industry. "Quasi-rent" may be regarded as payment for a resource which is temporarily specialized. Marshall, however, would say "limited in quantity" instead of "specialized." The two concepts have something in common, since if all of a resource is used in one industry, that industry cannot obtain more by withdrawing the resource from other industries.

3. Robinson Joan, pages 102-129.

A discussion of the rent problem followed by an analysis of the supply curve similar to Viner's.

3. Joint Demand and Joint Supply.--Here the theory of the demand for producers' goods will be reviewed and will be shown to be applicable to the supply of a commodity produced jointly with another commodity. Marginal cost and marginal productivity are in reality one concept, not two.

The theory requires modification where the proportion between two or more producers' goods used in the same process or between two or more products produced by the same process cannot be varied. In this case, there is no marginal

productivity for any one of the producers' goods or any one of the products considered separately.

Readings

1. Marshall, Principles, pages 381-393.
When two commodities (e.g. beef and hides) are produced in one process of production, what determines the cost of production of either one considered separately.
2. Kreps, Joint Costs in the Chemical Industry: in Quarterly Journal of Economics, 1930.
Contains some interesting illustrations (optional reading).

C. Price determination in the case of individual commodities considered in greater detail.

1. Long run and short run determination of price.--We have seen that the elasticity of supply of a commodity varies with the period considered, being greater for long periods than for short periods. The same applies also to demand, in the case both of producers' goods and consumers' goods. Moreover, the elasticity of supply for a given period is often greater for an increase of price than for a fall in price, except where the period is very short. The amount of any commodity that will be bought or sold at a given price and at a given time depends to a considerable extent on what the price has been previously. A consideration of the way the price of a commodity in an earlier period may affect its price at a later period enables us to see how certain measures taken to raise the prices of particular commodities, while effective in the short run, have tended to lower prices, in the longer run. The existence of cycles in the prices and production of certain commodities, particularly animal products, is to be explained in the same manner. Fundamentally such failures of prices to reach or maintain stable equilibrium are due to imperfect knowledge of market conditions and prospects on the part of producers.

Readings

1. Marshall, Principles, pages 363-380.
2. Keynes, J. M., A Treatise on Money, Vol. II, pages 135-144.
Deals with the influence of surplus stocks on prices.

2. The incidence of taxes and the effects of price fixing.---Under this heading, the effects of taxes on particular commodities, including tariff duties and the processing taxes levied in connection with the Agricultural Adjustment Program will be discussed. Some observations on the effects of taxation on the distribution of income will be made.

3. Equilibrium in the case of two or more related commodities.---This subject is extremely difficult, requires complicated mathematical analysis, and can only be discussed in a very elementary way in this course. It can be shown that under certain possible conditions a tax on a commodity will reduce the price paid by the consumer.

Reading:

Ezekiel, M. J. B. Certain aspects of the demand for competing commodities. In Econometrica, April 1933.
Discusses the demand for pork and beef.

4. Certain aspects of the technique of statistical price analysis.---The main problems to be considered under this heading are: (1) How to deal with correlated shifts in demand and supply curves; and (2) the difficulty of obtaining results which have application to long-run problems.

Readings:

1. Working, E. J. - What do Statistical Demand Curves Mean? A fundamental contribution to the theory of demand and supply curves. Working shows that changes of supply (i.e. shifting of the supply curve) reveal the approximate position of the demand curve when demand remains relatively unchanged (i.e. when the demand curve does not change its position); and that changes in demand reveal similarly the position of the supply curve.

2. Gilboy, E. W. - Demand Curves in Theory and in Practice. Raises the question whether statistical demand curves are demand curves at all. Gives a definition of the theoretical demand curve which seems unnecessarily abstract.
3. Rorking, Holbrook - Statistical Determination of Demand Curves and Ezekiel, M. J. B. - Factors Related to Lamb Prices. Two examples of the way in which the position of a demand curve may be estimated statistically.

D. Capital and Interest -- Profit in the Absence of Monopoly.---When a given quantity of physical resources is used to produce a certain product, there is always a certain interval which passes between the time when the resources are utilized and the time when the product is obtained. In general it is possible, by lengthening the interval of time, to increase the product obtained from a given quantity of resources. Thus time is itself a resource or factor of production. In the real world, some resources are being used to obtain a final product at an early date, others after longer intervals. In order to make it possible to pay for the services of a resource used in future production, somebody (in our own economic system the investor, in a socialist system the state) must devote a part of their current income to the production of future goods, thus not using it for the purchase of present goods. Thus savings are (in an economic though not always in a psychological sense) a demand for future goods. But future goods are cheaper than present goods since they can be produced with a smaller quantity of physical resources. With a rate of interest of five percent, \$105 worth of goods one year hence are worth only \$100 now. Thus the rate of interest merely reflects the price of future goods in terms of present goods. If the amount of resources required to produce \$100 worth of goods now can produce \$105 worth of goods a year hence, the cost of \$105 worth of goods one year hence will be \$100 (compare the section

on opportunity cost above, II, B, 1), and, (under perfect competition, or in a perfectly planned economy) the rate of interest will be exactly five percent.

Under perfect competition the cost of production and the purchase price of an instrument used for future production will be exactly equal to its discounted future yield, and its use will yield a rate of profit on the investment exactly equal to the market rate of interest. In our present economic system, however, the future yield cannot be foreseen with accuracy, mainly because the price of the product is subject to unforeseen changes. Hence the actual rate of profit differs from the rate of interest, the difference being pure profit, which is often negative, involving a net loss. "Normal profit" is the same thing as the rate of interest. It is often maintained, however, that "Normal profit" also includes an element of payment for risk. This view will be discussed.

Normally, capital is invested in permanent additions to the total existing stock of capital goods, i.e. instruments of production. The income derived from the investment is calculated by deducting from the gross returns of the instrument or instruments produced the amount necessary for their upkeep and replacement. Any savings made from this income and invested are used to make further additions to the stock of capital goods. The process of investment is thus cumulative, (except in so far as capital is lost through its use for purposes so unproductive that they fail to pay for the upkeep and replacement of the instruments.)

The rate of addition to the stock of capital goods is, in our economic system, largely determined by the time preference of individuals, that is, their preferences as between future and present purchasing power. Various observations will be made on this subject, of which the most important is that, generally speaking, a larger proportion of large incomes is saved than of small incomes

(the income-elasticity of demand for future goods is greater than unity.)

New additions to the stock of capital goods are made in two ways. (1) The increase in the stock required to keep per capita production from falling when the population increases; this mostly takes the form of additions to the number or increases in the size of the existing instruments without substantial change of their form. (2) Substitution for existing instruments of new ones which are more expensive and more labor-saving, involving an increased utilization of capital per head of population, and tending to raise per capita production. The latter form of increase is made possible by new inventions and, when the rate of interest is falling, by utilization of old inventions where they have not previously been profitable owing to the higher rate of interest.

Readings from: F. H. Knight, Irving Fisher, Gustav Cassel and Knut Wicksell.

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DEPARTMENT OF AGRICULTURE GRADUATE SCHOOL

REVISED OUTLINE OF THE COURSE ON
RECENT DEVELOPMENTS IN ECONOMIC THEORY

Instructor: H. J. Wadleigh

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- VI. Monetary and Business Cycle Theory in Relation to the Theory of Economic Equilibrium.
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This outline is intended partly to indicate what is contained in the course, and also to give a condensed summary of a few of the theories to be discussed. No attempt, however, has been made to express reasoning which can be more easily understood with the help of diagrams or equations which will be explained in class. It is not expected that students will be fully able to understand those parts of the outline which have not yet been covered in class or in the student's reading; but the outline may be found useful for reviewing ground already covered.

I. INTRODUCTION

1. The Development of Economic Theory. - The main part of economic theory has been developed through attempts to explain by deductive methods the behavior of prices in a capitalist economy. Two aspects of this problem which have, until recently, been kept separate in theoretical discussions are: (1) the determination of the absolute level of all prices in terms of money, i.e. the general price level, and (2) the determination of the relative prices of particular commodities. 1/

The first of these two sub-problems has been traditionally dealt with in a rather superficial way by the quantity theory of money which was developed by the mercantilists and perfected by their critics in the 18th century, and which has thrown some light on certain particular economic phenomena such as those of international exchange and those of extreme inflation.

The theory dealing with the second aspect has been broader in its applications, and has attempted to explain the way in which production, consumption and the distribution of incomes affect and are affected by the relations between prices. This theory has been based on the doctrine of economic equilibrium, according to which prices, production, consumption and incomes are constantly tending towards an equilibrium level which is determined by: (1) the technical conditions of production; (2) the quantities of resources available for production;2/ and (3) the choices of individuals as between (a) the purchase of different consumption goods, (b) work and leisure, and (c) consumption and savings. These fundamental conditions have been thought to influence the variables in such a way that if the latter were ever finally to reach equilibrium they would not move away from it unless the fundamental conditions changed. It is in this sense that the equilibrium has been regarded as stable, any actual instability in the variables (i.e. prices, production, etc.) being attributed to changes in the fundamental conditions.

Essentially this type of economic theory is a theory of individual choices.

Its conclusions have been deduced from assumptions which all economic theorists have realized not to be entirely true, although some have thought them either approximately true or at least possible under the capitalist system. The main assumptions are: (1) that individuals are activated by the profit motive and act rationally (within the limits of their technical knowledge) in those of their activities which are concerned with business or with earning a living; (2) that they possess perfect knowledge of market conditions and prospects insofar as these are relevant to their decisions; and

1/ In the theory of international trade the relations between the price levels of different countries have been discussed at least for the past 3 centuries. But this discussion has had little or no relation to theories about the prices of particular commodities.

2/ The conditions of ownership of these resources must be added as a condition which together with the other conditions determines the incomes of persons.

(3) that the existence of monopolistic price fixing and other influences tending to reduce the effectiveness of economic incentive is of minor importance.

This type of economic theory in its more complete form is the work of the neo-classical economists (this term is here applied not only to the Masshallian or Cambridge School, but also to the Mathematical or Lausanne, and the Austrian, schools of economic thought) who developed it during the late 19th and early 20th centuries. Many of its essentials, however, are derived from the theories of the classical economists, namely Adam Smith, Ricardo, and some of their contemporaries.

Neo-classical economic theory has been severely criticized for its use of the method of making deductions from a few simple assumptions. Critics have in the main proposed two approaches as a substitute for or supplement to the deductive method: (1) a study of economic institutions in their sociological and historical setting, and (2) statistical analysis of trends and correlations. It is not always fully realized that the results of the statistical method are in general likely to have meaning only if changes in institutions do not significantly affect the data studied. But there can be no doubt that a combination of deductive, institutional and statistical analysis is necessary for the fullest possible understanding of the way in which the capitalist system or any other economic system works.

In order to make the best use of the deductive method it is necessary to expand its basic assumptions beyond the simple ones outlined above. Considerable progress in this direction has been made by various theorists in the past few years. Until very recently the theory of monopoly was treated as an isolated problem, but in the past few years the effects of monopolistic influences on our whole price structure have received considerable attention.

A similar revolution has taken place in the theory of money. Until a few years ago the only type of monetary theory generally known in the English speaking countries consisted of a few refinements of the quantity theory of money of the 18th century. That theory, not being organically related to the theory of relative prices, does not explain such things as the effect of a change in the demand for capital goods on the general level of prices. Moreover, the quantity theory of money is essentially one of stable equilibrium. It is now generally realized that no theory of stable equilibrium can be adequate to explain the business cycle. Modern monetary theory, in analysing the interrelations between price levels, interest rates, and the investment of capital, has already thrown some light on the sources of instability in our economic system. Moreover, some economists have sought at least a partial explanation of the business cycle in a modification of the assumption that producers have adequate knowledge of market conditions and prospects (a modification that is essential to the explanation of such phenomena as cycles in livestock prices and production).

Finally, the theory of international payments has recently undergone some modifications which are related to recent developments in monetary theory.

2. The Logical Method of Deductive Economic Theory. - Deductive reasoning is a process of thought which reveals the implications of a set of assumptions. In itself it does not deal with facts, but it is a necessary tool of analysis in discovering causal interrelations between facts. Since the conclusions are implied in the assumptions, it follows that if the assumptions are facts and the reasoning correct, the conclusions must be facts. If the conclusions are not facts, not all of the assumptions can be facts. Actually the assumptions of economic theory are never completely true, but are at best a simplified version of the truth, and the conclusions are therefore merely approximations to the truth. Consequently, economic theory is not a fool-proof instrument of analysis and must be used with a due regard for the differences between assumptions and facts. The recent developments of theory referred to above have brought the assumptions somewhat nearer to reality, which has made the reasoning more complicated and has increased the need for precision.

The newer developments are mainly an elaboration and extension of the older theories, and the latter must be understood in order to understand the former. Moreover, the recent developments have been made possible largely through a more precise and rigorous statement of the earlier theories than is to be found in many standard works on the subject. In this course we start first with a highly simplified set of assumptions and then proceed progressively to elaborate them.

3. The Subject Matter of Economic Theory. - Economics is a study of the ways in which scarce resources are used to satisfy human wants. By "scarce resources" we mean resources which are so limited in quantity that additional human wants could be satisfied if we had more of the resources. The term resources is interchangeable with the term factors of production, and includes labor, natural resources and productive equipment created by man. For some purposes technical knowledge may also be included.

Two uses of economic theory are to be distinguished. Economic theory can be used to explain how particular economic systems actually work; this we shall call explanatory economic theory. It is also frequently used to evaluate the effectiveness of economic institutions in providing the greatest satisfaction of wants possible with the available resources; this we shall call critical economic theory. To illustrate; the economic consequences of the imposition of a tariff duty are similar to those of an increase of transportation costs on the imported commodity, and for explanatory theory tariffs and transportation costs can be regarded as equivalent. Since, however, it can be shown that tariff duties in general reduce the national income, and since they can be repealed, they are not, for the purposes of critical theory, equivalent to transportation costs.

4. Definitions of Perfect Competition, Monopoly, etc. - A seller of a commodity is a monopolist if he can, by his own operations, significantly influence the price of the commodity he sells. This means that he can, within certain limits, set his own price. There are degrees of monopoly, but no absolute monopoly, and monopoly is not incompatible with some degree of competition, but only with atomistic competition. When no single seller in a market is large enough to exert any significant influence on price, we have

atomistic competition between sellers. Competition which is not atomistic is monopolistic. Perfect competition among sellers exists when four conditions are present, namely: (1) competition is atomistic; (2) each producer has perfect knowledge of present and future market conditions insofar as they are relevant to his operations; (3) the number of sellers who have access to the market in question is not artificially restricted;^{1/} and (4) prices are not fixed over significant periods by law, contract, custom, or any similar hindrance to the free play of economic incentive. The same definitions apply to buyers in a market. It is obvious that perfect competition exists nowhere, and that to assume perfect competition can be useful only in making a first approximation to reality. The effects of the various imperfections of competition listed above are considered in some detail in this course.

II. THE THEORY OF PERFECT COMPETITION.

In this part of the course certain basic ideas, most of which are not new, are developed.

1. The Choice of Resources in Production. - The principles of choice which underlie the whole of deductive economic theory are exemplified in their simplest form in an analysis of the relations between the prices of resources ^{2/} and their use by an individual or enterprise producing a commodity for sale and possessing a given, limited knowledge of the technique of production. It is a fact ascertained by observation that in most cases a commodity can be produced with differing proportions of the various resources entering into its production. The relative amounts of the various resources used by a rational producer will depend on their prices. If the price of one resource rises, the producer will economize on that resource, his use of it will decrease relatively to that of the other resources, and thus the proportions will be varied. This is the principle of substitution. (The special case in which the proportions can not be varied will be considered later.)

If the quantity utilized per unit of time (i.e. input) of one resource is increased, starting from zero, by successive additions of equal amount, while the inputs of the rest are held constant, then each successive increment of the varied resource will at first make a larger addition to the total output of product than did the preceding increment; but after a certain point is reached the successive additions to total product will progressively decrease and finally become negative. This again is a fact ascertained by observation. The additional output obtained from the addition of one unit ^{3/} to the input of the varied resource is known as the marginal product of that resource (sometimes also known as marginal physical productivity). The market value

^{1/} This condition is relevant only for critical economic theory.

^{2/} This term is used in the present sub-section to include not only primary resources, such as labor, land etc., but also intermediate products used in further production, such as raw materials, buildings, machinery, etc.

^{3/} The size of a unit is of course chosen arbitrarily, but it must be small in comparison with the total amount involved in order to get a result which approximately describes the effects of continuous variation.

of the marginal product is the marginal productivity (or marginal value productivity) of the resource. A rational producer, will use any resource in a larger quantity than that which would make its marginal product a maximum, but in a smaller one than those which would make its marginal product negative. Thus, regardless of price, the input of any resource will lie within a certain range. Within that range any increase of input will reduce the marginal product. This is the law of diminishing returns. Moreover, within the range mentioned, a rational producer will choose that input which makes marginal productivity equal to price.

The same relationships can be looked at another way, by supposing that the inputs of all but two resources are held constant and that as the input of one of the two variable resources is changed, that of the other is made to change in such a way as to keep the output of product unchanged. If the input of B is reduced, some increase in that of A will be required to compensate for the reduction of B if output is to remain undiminished. The additional amount of A required to compensate for a reduction of one unit in the input of B is known as the marginal rate of substitution of A for B. In typical cases, as A is progressively substituted for B, the marginal rate of substitution of A for B will in fact progressively increase. It can be shown that the marginal rate of substitution of A for B equals the marginal product of B divided by that of A, and that a rational producer, in deciding how to produce a given output, will choose such inputs of A and B as are required to make the marginal rate of substitution of A for B equal the price of B divided by that of A. The same principle can be generalized to the case where all resources are varied within the limits of physical possibility.

Knowing the prices of resources (which we assume given at this stage of our analysis), and the input of each resource which the rational producer would choose in order to produce any given output, we know the cost of each output. In general a productive unit (one factory or one farm) producing a correspondingly large output will produce at a high average cost. The same will apply when a very small output is produced. At some intermediate point the average cost will be a minimum. We must now consider the relation between the cost of the output and the price of the product. If the price is sufficiently high relative to the prices of the materials and resources, the total value of the output will exceed its cost of production (inclusive of "normal profit") and there will be a pure profit. It can be shown that this will increase the output beyond the point where average cost is a minimum. Similarly a pure loss will make the output less than that which can be produced at minimum average cost. The attractiveness of pure profit, however, will tend to increase the number of units producing the commodity, which will lower its price. This process will continue until pure profit disappears and the output of each unit is that which can be produced at lowest average cost. The corresponding adjustment will take place if a pure loss occurs. Hence it can be shown that perfect competition is incompatible with the condition in which an increase of output by the individual producer will reduce average cost. The existence of such a condition over a long period of time is evidence of monopoly.

2. The Choice of Commodities by an Individual Consumer. - According to what was formerly the orthodox theory, a consumer tends to distribute his income among expenditures for various commodities in such a way as to

make his total utility a maximum. This implies that a consumer with a given income and given tastes will so choose the quantities of the various commodities that their marginal utilities are proportionate to the prices he has to pay for them. The newer theory has dropped the concept of utility and substituted for it a purely behavioristic concept, namely the marginal rate of substitution between commodities. The marginal rate of substitution of A and B, in the case of the final consumer, is the smallest quantity of A which he would consent to accept for a reduction in his consumption of B by one unit. It is implied in the definition of this concept that the consumer will so choose the quantities of the commodities that he purchases with a limited income that the marginal rate of substitution of A for B will equal the price of B divided by that of A, this relationship holding for all commodities.

This approach is adequate for the purposes of explanatory economic theory if we are willing to accept consumers' choices as given and do not try to explain them. It is not adequate for such propositions of critical economic theory as that according to which a fairly equal distribution of a given national income yields more total satisfaction than a highly unequal distribution. Some economic theorists object to such propositions.

3. General Equilibrium Under Simplified Conditions. - The theory of equilibrium in a whole economic system can be developed on the basis of the theories outlined above. This is mainly the work of the Austrian and mathematical schools. (Marshall developed the main features of the theory of shifting equilibrium in particular markets.) At the present stage of the analysis the accumulation of capital and the costs of, or obstacles to, the movement of resources and goods from one place to another are ignored 1/. The principal assumptions are: that competition is everywhere perfect; that producers act rationally within the limitations of a given amount of technical knowledge; that supplies of primary resources are given; that the quantity of each resource owned by each person is given; and that the tastes of consumers are given. Subject to these assumptions it can be shown that the relative prices of all commodities, the outputs of all commodities other than primary resources, and the incomes of all individuals are determined by four conditions; namely: (a) that the marginal rates of substitution of all consumers goods, and those of all resources and producers' goods, are proportionate to their price ratios in the manner indicated above; (b) that the price of the services of every resource and producers' good is equal to its marginal productivity; (c) that all resources are fully employed; and (d) that every productive unit is producing the most efficient output (i.e. the output of lowest cost).

It can be shown that these conditions are necessary for the maximization of real income 2/ (the phrase "real income" being defined in terms of consumers' choices 3/); they are, however, not sufficient in themselves, because of

1/ A consideration of spatial movement and spatial immobility of goods and resources in part of the theory of interregional and international trade.

2/ Condition (d) is not necessary when the required output can be most efficiently supplied by a small number of productive units. Where this is the case, however, it will still be necessary that the whole output be produced at the lowest possible cost.

3/ It must be noted that the state is in all modern societies and important consumer, that is to day, an important maker of choices of consumption for its citizens. It decides how much they shall consume of such important things as highways, education and battleships.

the problems we have decided to ignore at this stage. Moreover, the distribution of income under perfect competition is not likely to be that required for maximizing total satisfaction. There is, however, a possibility of redistributing income, within certain limits, through taxation without violating the conditions listed above.

Because of the significance of these conditions in connection with real income, it is clear that the theory of general equilibrium under perfect competition is useful not only for explanatory economic theory as a first approximation to the study of our actual economic system (requiring to be greatly modified by further analysis), but also for critical economic theory in laying down some of the specifications for an ideal economic organization. The conditions mentioned above could of course be approximately fulfilled in a planned (and not competitive) economy. In fact an intelligently planned economy could come very much nearer to realizing them than our present system does.

4. The Meaning of Cost. - Under the conditions of our first approximation, where the supplies of all primary resources are fixed, the production of one commodity can be increased only by transferring primary resources to its production from the production of other commodities, and so reducing the output of the latter. Hence the cost of producing one commodity is the unused opportunity of producing others. The additional quantity of commodity A that could be produced if one unit less of B were produced is the cost of B in terms of A, which we will refer to as a cost ratio. It can be shown that under conditions of perfect competition this is equal to the price of B divided by that of A. This result is basic for the theory of cost, but requires modification before it can be applied to the problems of the real world. The first modification results from the fact that in the real world the supplies of primary resources are not absolutely fixed. If the producers of commodity A bid up the price of unskilled labor in their efforts to obtain more of it, the total supply of unskilled labor may either increase because laborers work harder for higher wages, or decrease because with a higher rate of wages per hour they prefer to work shorter hours. In either case, commodities other than A will not be the only cost of A. In fact the cost of A is anything we may substitute for A, and we may substitute leisure as well as substitute other commodities. A further modification of the same kind is due to the fact that people will sometimes willingly accept a lower wage for one kind of work than they can get for another, because the former is less disagreeable.

A second modification is due to the fact mentioned above that more or better work is often performed for higher wages. It is not possible to fit this fact into the concept of cost as an alternative.

A third important modification results from the existence of unemployment, due to monetary disturbances and imperfect competition. This means that in the real world the producers of commodity A may obtain more labor simply by hiring some of the unemployed, at no sacrifice to the latter. Here there is a money cost to the employer, but no real cost to society. In the long run, however, the wages that the producers of A must pay are largely determined by the opportunities available for workers in alternative employments.

III. THE THEORY OF SHIFTING EQUILIBRIUM IN PARTICULAR MARKETS.

This part begins with a discussion of the meaning of supply and demand curves, on which some important recent work has been done; passes on to the subject of the long and short run responses to price; and ends with some observations on competitive and complementary relations between commodities.

1. Demand for Consumers' Goods. - A further elaboration of the subject discussed under II, 2. The influence of changes in prices, income, and consumers' preferences on the quantity of a particular commodity purchased by a producer. Definition and discussion of the following concepts: elasticity of substitution, income elasticity of demand, and price elasticity of demand. The relation of indifference curves to demand curves. Some observations on the statistical measurement of demand.

2. Supply. - Relations between the cost curves of an individual producer and the supply curve for the product of a whole industry. Generalization of the Ricardian concept of rent as payment for a specialized resource.

3. Long and Short Run Equilibrium. - Because of their ignorance of future prices, producers tend to plan on the assumption that prices will remain at their existing level. At least if we assume this we are probably nearer the truth than in assuming perfect knowledge, although a significant degree of foresight no doubt exists in some cases. Except insofar as such foresight exists in a significant degree, production is influenced by a change of price only when the change has occurred. Since it takes time to increase production of any commodity, elasticity of supply is in general less in the short run than in the longer run. Output in any industry must be regarded as a function of price with a distributed lag, the distribution of the lag varying greatly from one commodity to another. Moreover, since it usually takes longer to wear out old equipment than to construct new equipment, the elasticity of supply for a period of intermediate length is usually greater with a rise in price than with a fall in price.

The tendency of producers to plan future production on the basis of present prices often gives rise to cycles of alternating overproduction and underproduction in particular industries. Such cycles are particularly conspicuous in the case of livestock production, but are also to be found in other branches of agriculture and in manufacturing industry. They must be distinguished from the general business cycle and from replacement cycles in the production of durable goods, both of which are discussed later.

Where perfect knowledge exists, the elasticity of supply will be smaller in response to a change of price which is going to last only for a limited time than in response to a permanent change. Seasonal changes of price can be foreseen to a considerable extent. No producer would make an addition to his capital equipment because of an anticipated seasonal rise in price, such as he would make in response to an anticipated permanent rise.

The demand for producers' goods is less elastic in the short run than in the long run for reasons similar to those indicated in connection with elasticity of supply. Demand for consumers' goods is likely to be less elastic in the short run than in the longer run because of imperfect knowledge and the slowness of changes in habit on the part of consumers.

4. Classification of Resources or Factors of Production with Reference to the Long and Short Period. - The traditional classification of resources into land, labor, and capital is not sufficiently precise for the purposes of modern economic theory. Actually there are many kinds of natural resources and of labor, each kind having a comparative advantage over others in certain uses. As for capital, it will be shown below that time is itself a scarce productive agent, and that capital goods are the saved-up services of land and labor, of which it has been possible to increase the productiveness by postponing their utilization. At the present stage we are concerned only with the results of this saving-up process as embodied in capital goods. A capital good is, during its lifetime, usually a highly specialized resource. When it wears out, however, it can be replaced by another kind of capital good, with the result that in the long run capital goods are not specialized. Labor also tends to be less specialized in the long run than in the short run, because of the time which it takes to acquire the knowledge and habits required by a new occupation.

5. External Economies and Diseconomies and Related Problems. - It has been pointed out by Marshall that an increase of the number of productive units in an industry may either raise or lower cost - that productive efficiency is influenced not only by the size of the unit but also by the number of units. Cases where an increase of the number of producers reduces efficiency may be found in the drilling of too many wells in an oil-field, in the over-grazing of open ranges, and in the overcrowding of traffic on a highway. All these are cases where there is unrestricted (or insufficiently restricted) access to a scarce resource, and any person availing himself of an additional quantity does not bear the full cost of his use of it. Economies resulting from an increase in the number of productive units in an industry are of a less definite nature; they include such things as the development of a broad market for labor with the type of skill required for the industry, the more effective development of auxiliary industries, more rapid development of technical knowledge, etc. These can be shown to be cases in which an individual producer does not obtain the full benefits of his own operations.

In addition to the problems connected with external economies and diseconomies in an industry, there are others of considerable social importance connected with the fact that the economic costs of certain devices are not always borne, and the economic gains resulting not always obtained, by those who make the choice. It is partly on these grounds that the planning of urban and suburban land development is to be justified.

6. Demand for Producers' Goods and for Factors of Production and the Supply of Joint Products. - The analysis of the preceding section is applicable here with some elaborations, including the distinction between marginal net productivity and marginal gross productivity of factors of production and the corresponding distinction between marginal net cost and marginal gross cost of joint products. The most important application of the analysis developed here is to the theory of wages. In this case, however, it requires some modification to deal with monopolistic influences.

7. The Incidence of Taxes and the Economic Effects of Government Regulations to Restrict Production or Consumption. - Various problems are introduced here as examples of the application of theories discussed above.

8. Theory of Equilibrium in the Case of Related Commodities. - The supply and demand curves discussed above are based on the assumption that a change in the price of one commodity will not disturb the ratios between the prices of other commodities. They are applicable as a tool of analysis only when this assumption is approximately correct. When it is not so we must consider competitive and complementary relationships between commodities both in production and in consumption. An adequate study of this subject requires the use of advanced mathematical methods which are outside the scope of this course. A few more elementary propositions only will be discussed.

IV. THE THEORY OF ECONOMIC GROWTH.

1. The Productiveness of Time. - When any resource is used in the production of a commodity or service there is usually a certain interval of time which passes between the moment when the resource is used and the moment when the final product appears. In general, it is possible to increase the quantity of product obtained with a given set of resources by lengthening the interval of time. Thus time is itself a productive agent. The most important way in which time is used productively is the use of resources to produce instruments of production which in turn can be used to turn out final products over a long period of time. Such instruments are called capital goods.

2. The Rate of Interest Under Perfect Competition. - It is the productiveness of time which makes possible the earning of interest in productive investment. It can be shown that the rate of interest under perfect competition would be equal to the marginal productivity of time.

In order to make it possible to pay for the services of a resource used in future production, somebody (in our own economic system the investor, in a socialist system the state) must devote a part of their current income to the production of future goods, thus not using it for the purchase of present goods. Thus savings are (in an economic, though not necessarily in a psychological sense) a demand for future goods. But future goods are cheaper than present goods since they can be produced with a smaller quantity of resources. The rate of interest reflects the price of future goods in terms of present goods. With a rate of 5 percent, \$105 worth of goods one year hence is worth only \$100 now. If the amount of resources required to produce \$100 worth of goods now can produce \$105 worth of goods a year hence, the cost of \$105 worth of goods one year hence will be \$100 and (under perfect competition or in a perfectly planned economy) the rate of interest will be exactly 5 percent.

Moreover, by varying the methods of production it is possible to use the services of a resource at a given time for turning out a final product either at once or in the future. If a larger proportion of resources is used for future production, future goods will cost more in terms of present goods, but will be less desired because they will be less scarce and because present goods will be more scarce. In allocating resources between present and future production, equilibrium will exist when the cost ratio of present and future goods equals their marginal rate of substitution.

Interest may be looked at in another way. When a resource is used in the production of future goods, its marginal product is greater than it would be if it were used in the production of present goods. Under perfect competition the employer of the resource pays for it an amount equal to its marginal productivity in present production, and the excess of its marginal productivity in future production over its marginal productivity in present production enables him to pay interest on the capital invested in its use. Interest is (except in the case of loans for consumption purposes) a payment for money, or capital, invested, i.e., for the money required to remunerate resources used in the production of future goods. Hence we may regard it as payment for the opportunity to use resources in future production. The greater the quantity of resources used in future production, the smaller will be the excess of the marginal productivity of the former over that of the latter, (just as a greater use of one resource in proportion to other resources leads to a reduction of its marginal productivity). Under perfect competition the quantity of resources used in future production will be that which makes their excess marginal productivity equal to the rate of interest. Thus if the rate of interest is 5 percent, an additional unit of any resource would produce 1.05 times as much one year hence as it would immediately. If the rate of interest is raised, a smaller quantity of resources will be used for future production and hence their excess marginal productivity will rise correspondingly; and vice versa. Hence we have a demand schedule for resources for future production which is also a demand for capital. The saving of money out of current income is the supply of capital. Hence the condition of equilibrium is that the rate of interest must be such as to make the quantity of money saved equal to the quantity of money invested. It will be seen later that this is also a condition of equilibrium in the monetary system.

3. Cost of Production, Quasi-rent and Profit. - Under perfect competition the value, at any date, of the future productivity of a capital good, discounted at compound interest would be equal to its original cost of production less its past productivity, the two latter amounts being accumulated at compound interest. Both will also be equal to the cost of reproduction of the capital good (due allowance being made for any loss in its physical productiveness due to its past use). Actually, however, owing to imperfect knowledge of future price changes and inventions, these equalities do not hold. In the absence of monopoly the cost of production of a capital good tends to be equal to the estimate of its discounted future productivity made at the time when it was decided to produce it. A departure of the actual productivity from this estimate gives rise to pure profit or pure loss, the actual productivity being what Marshall has called quasi-rent. This topic is of some significance for problems connected with the valuation of public utilities. Its main theoretical importance, however, is in connection with the theory of money, as will be seen later.

4. The Growth of Resources and the Period of Production. - The net income derived from the use of a capital good is customarily calculated by deducting from its productivity the amount believed necessary to replace it when it wears out with a similar instrument of equal productivity. When the amount deducted for replacement is thus reinvested and, in addition, a part of the net income also is invested in new capital goods, the process of investment becomes cumulative. In time of peace the process is usually cumulative for society as a whole.

We may regard those resources which are used for current replacement of capital goods, and goods in process, as being used for the production of present goods; and those used for net additions to the total stock as used for the production of future goods.

This concept of the accumulation of capital is lacking in exactness, since it is impossible, except under certain simplifying assumptions, to know precisely what is required for replacement. An alternative method of statement is to use the concept of the average period of production, which is the average length of time passing between the input of resources and the output of final product. This quantity, however, needs to be corrected for compound interest if it is to have economic significance. The whole concept has recently been questioned by Knight and others. If it may be used, then we may say that the quantity of capital has increased relatively to the quantity of the other resources when the corrected period of production has been increased.

The rate of growth of capital may, or may not, but usually does, exceed the rate of growth of population. If it does, capital tends to replace labor in production through the use of more labor saving methods, which is the same as an increase of the period of production. Partly as a result of this, per capita real income tends to increase. Per capita real income, however, also is affected by the size of population relative to natural resources. The use of more labor saving methods may be made possible either by new inventions or by a fall in the rate of interest which makes possible the utilization of old inventions where they had not previously been profitable. Inventions may be either labor-saving or capital-saving. Labor-saving inventions tend to predominate and to raise the rate of interest. On the other hand, an accumulation of capital more rapid than the growth of population tends to lower the rate of interest. These two forces have been in approximate balance for several centuries.

5. The Economic Theory of Technical Progress. - It has been customary among economists to regard technical knowledge as a datum or an independent variable for the purposes of economic theory. It can be shown, however, that labor spent in the making of inventions or in the acquisition of skill is devoted to future production in the same way as labor spent in the making of a capital good. An invention is, in fact, a kind of capital good. The conditions under which inventions become private property in our present system do not appear to be such as to encourage the most effective allocation of resources to the creation of new technical knowledge.

V. THE THEORY OF MONOPOLY AND MONOPOLISTIC COMPETITION.

1. Monopoly Equilibrium. - The use of the concept of marginal revenue has made possible a simpler and more satisfactory statement of the theory of monopoly equilibrium which was originally developed by Cournot and which is to be found in Marshall's Principles. Marginal revenue is the amount which an addition of one unit of the commodity to the quantity sold by the monopolist would add to the total value of his sales. It bears the same quantitative relation to demand price as marginal productivity does to average productivity. Monopoly profit is maximized when marginal revenue equals marginal cost. This theory tells us how the monopolist would decide what quantity of the commodity to sell and at what price, if (a) his aim were to maximize his profits, (b) he

were able to make the decision intelligently, and (c) he knew the shape and position of the demand curve for his product. The last two assumptions are very imperfectly realized in the actual world. Hence the theory does not indicate exactly what price will be charged under actual conditions but it does indicate what price it is in the monopolist's interest to charge.

It indicates the latter, however, only on the simplifying assumption that there is no difference between the long run and short run elasticities of demand. The theory therefore needs to be modified to take into account the effect which a given price would have on the future position of the demand curve.

Another problem connected with monopoly equilibrium is that of advertizing and selling costs. It can easily be shown that advertizing cannot be useful to the advertizers under atomistic competition. No sharp distinction can be made between production cost and selling cost. If this distinction is made as a simplifying assumption, however, the conditions of equilibrium, which are rather complicated, can be defined. A significant distinction is that between advertizing which increases the consumer's knowledge and that which merely creates a blind preference. In general, the former will tend to increase the elasticity of demand for a monopolist's product and the latter to reduce it.

2. Monopoly Profits. - Monopoly profit is usually defined as the difference between the total value of sales by the enterprise and the total of payments made for resources and producers' goods by it. This may contain an element of pure profit or loss due to imperfect knowledge. The definition raises a difficult problem as to the determination of the return attributable to capital contributed by the owner of the enterprise. The orthodox solution is to refer to a "normal" return on capital. The monopoly profit then becomes the difference between the returns actually obtained by the owners and the normal return on their capital. A more satisfactory approach might be to consider the monopoly profit simply as a capital sum, namely the difference between the market value of the stock of the corporation at the time of its foundation and the amount actually invested in the enterprise by its owners. In the real world this difference probably accrues usually to the promoters of the corporation, who are to be regarded as the true monopolists. Monopoly profit thus defined depends not on the actual earnings of the monopoly but on the anticipations of the investors regarding earnings. The element of imperfect knowledge is therefore involved as well as that of monopoly.

3. Monopolistic Competition. - The theory of equilibrium in monopolistic competition has been worked out by Joan Robinson and E. H. Chamberlin on the basis of certain simplifying assumptions. Two alternative sets of assumptions have been used: (a) There is free access to the industry and any producer in it has the same opportunities for profit as any other. This condition would be realized if consumers' preferences for the products of particular sellers were evenly distributed, so as to give no seller an advantage over others, and if at the same time costs were the same for all sellers. Under these conditions competition between sellers would result in the absence of monopoly profit, but the imperfection of the market would make the output of the individual productive unit smaller than that required for maximum efficiency. The alternative assumption (b) is that the number of sellers who have access to

the market is restricted to a definite number. Then there will be monopoly profit and the size of output of the productive unit will be greater than that required for maximum efficiency.

In the real world a situation in some respects intermediate between these two probably exists in many cases. A fairly general consumers' preference for the products of particular sellers, due to their established position in the market and past advertizing makes it unremunerative for new sellers to enter even if the ones already in the market are making considerable monopoly profits.

The possibilities of obtaining future profits through advertizing make further modifications necessary: The advantages of large-scale advertizing may make the output of a single seller larger than the most efficient output.

4. Sticky Prices. - It is a matter of common observation that the prices of monopolized products do not respond as readily to changes in conditions of demand and cost as do those of commodities produced under atomistic or nearly atomistic competition. Prices of monopolized products sometimes remain absolutely fixed for periods of years. In general such prices have shown a strong tendency to lag behind in the recent general decline of prices. The types of theoretical analysis referred to above do not afford an adequate explanation of this phenomenon. Four considerations may contribute towards an explanation: (a) Monopolists, owing both to lack of knowledge and lack of intelligence, do not know what price changes should be made when conditions change and consequently are inclined to make no change; (b) A reduction of price often involves a loss in the short run, balanced by a greater profit in the long run, short run elasticity of demand being less than long run elasticity. In a depression the financial weakness of monopolists discourages them from making the temporary sacrifice involved in a reduction of price; (c) In a depression the obstacles to the financing of a new enterprise make the sellers who are already in the market less apprehensive of the entry of new competitors; (d) Where there is fairly close competition between monopolists, each one of them may be prevented from lowering his price by the fear that his competitors will do likewise, but unwilling to raise it for fear they may not. The expectations on the part of one monopolist regarding what his competitors may do have been given some attention by Chamberlin, but further analysis is possible.

5. Discriminating Monopoly and Dumping. - Where a monopolist has the opportunity to sell at different prices in different markets, his profit is maximized when the marginal revenue in each market is equal to the marginal cost. Price will then be higher in those markets which have a less elastic demand than in those which have a more elastic demand. Where the marginal cost curve is negatively sloping the opportunity to discriminate will make it profitable to charge a lower price in all markets than would be profitable without the opportunity to discriminate. Selling in one area at a lower price than in other areas is technically described as dumping.

6. Purchaser's Monopoly. - So far the discussion has been based on the assumption that a monopolist, or a group of monopolists, is selling in a market where atomistic competition exists among purchasers. The analysis is essentially the same if it is assumed that a monopolistic position is

held by the buyer or buyers, and that sellers are atomistic competitors. In the case of a resource, or producers' good, the buyer's profit will be maximized when the marginal cost of the resource (or producers' good) to the buyer (marginal cost in this case does not refer to cost of production but means the amount which the purchase of an additional unit will add to the total amount paid for the resource) equals its marginal productivity. Where the buyer of the resource has a monopoly of the product which the resource helps him to produce, the marginal productivity of the resource will not be its marginal product multiplied by the price of the commodity but its marginal product multiplied by the marginal revenue of the commodity. This analysis has significant applications to the theory of wages. It shows that only if the employer is an atomistic competitor both as an employer and as a seller of his product will the wage tend to equal the value of the marginal product of labor. Otherwise it will be less. It can also be shown that under certain circumstances and within certain limits the raising of a wage rate by fixing a minimum may increase employment, in contrast to the tendency of an artificial raising of wages to reduce employment when the employers are atomistic competitors.

7. Monopoly and the Theory of General Equilibrium. - It has been shown earlier that, subject to certain important qualifications, perfect competition would tend to maximize the real incomes of consumers. The existence of selling monopolies tends to make the real incomes of consumers as a whole less than they would be under perfect competition. It tends to restrict below its optimum the production of those commodities in which the elasticity of demand of the product of a single producer is small, and by diverting resources away from the production of these to raise above the optimum amount the production of those commodities in which the reverse is true. An additional distortion of production results from the existence of monopolies in the purchase of resources and producers' goods.

Monopoly also tends to change the distribution of income, insofar as it gives rise to monopoly profit.

It can easily be shown that the existence of monopoly in itself is not inconsistent with the minimum of unemployment of resources. The existence of monopoly, however, may greatly increase the amount of unemployment likely to result from monetary disturbances and from disturbances in the investment of capital, as will be shown later.

VI. MONETARY AND BUSINESS CYCLE THEORY IN RELATION TO THE THEORY OF ECONOMIC EQUILIBRIUM.

1. The Functions of Money. - Money is generally used for three purposes: (a) as a means of exchanging goods; (b) as a means of keeping purchasing power in liquid form; and (c) as a unit of account for the measurement of value and for the determination of debts. The same thing need not necessarily be used for all three purposes, but ordinarily the unit of account refers to those things (coin, treasury notes, banknotes and bank deposits) which are used for the first two purposes. The second purpose is, however, also partly served by various more or less negotiable securities which are not ordinarily used for the first purpose and of which the value is not absolutely fixed in terms of the unit of account. Monetary theory is concerned with the way in

which money and any significant substitutes for it are used for these purposes. It is not possible to lay down any general rule as to what should be included under the term money; it is convenient for some purposes to use the term more inclusively than for others.

2. The Cash-balances Theory. - The old quantity theory of money, according to which an increase, in a given ratio, of the quantity of money existing in a particular society will be accompanied by an increase of prices in the same ratio, can be made to follow from three assumptions: (a) the quantity of each commodity exchanged for money in a unit period of time is given; (b) the ratios between prices are given; (c) the amount of money which each person chooses to hold (that is to say, his cash balance) is a given proportion of the total amount of money transactions made by himself. The first two assumptions would be appropriate if the equilibrium of production and relative prices were not affected by the monetary conditions themselves. Since it is so affected to a very significant extent in the real world, these two assumptions can be used only in making a first approximation. Similar considerations apply also to the third assumption, as will be seen below. This last assumption is, however, justified as a starting point by the fact that the amount of property which a person finds it convenient to hold in the form of cash is largely determined by the nature and extent of the monetary transactions which he commonly makes. If this assumption is made, then the total value of all money transactions is determined by the amount of money in circulation. If the amount of money were increased, certain persons, having more money than they required, would reduce their cash balances and so would raise their current purchases above their current incomes. This would raise the total value of money transactions, and, the nature of these transactions remaining unchanged (as is implied by the first of the three assumptions), this process would continue until the normal ratio of cash balances to the value of transactions was restored. The total value of transactions would then have increased in the same ratio as the quantity of money.¹ It follows, moreover, from the first two assumptions that prices would also rise in the same ratio.

3. Velocity of Circulation. - The ratio of total cash balances to total money transactions is the reciprocal of the velocity of circulation, which is the ratio of money transactions to cash balances. The theory stated above is based on the assumption that this ratio is fixed. Actually, however, the ways in which increases in cash balances can come about (namely gold production, the printing of paper money and the expansion of bank credit) have significant effects on production, interest rates and other economic conditions, which affect the velocity of circulation. When the change is such as to raise prices, interest rates, and profits,^{1/} this tends to increase the velocity of circulation. Persons tend to reduce their holdings of cash because cash is depreciating in terms of commodities, and to convert their holdings of cash into interest bearing securities or productive property, since the income which these things yield has increased. Similarly a fall of prices, interest rates and profits tends to reduce velocity of circulation. Hence an increase (or fall) of prices tends to affect the conditions of monetary equilibrium in such a way as to induce a further increase (or fall) of prices, which introduces an element of

^{1/} The way in which changes in monetary equilibrium affects interest rates and profits, tending to reduce these when prices are tending to be reduced, is analysed at a later stage.

instability into the equilibrium. The importance of this can be seen from the fact that changes in the velocity of circulation associated with the business cycle are proportionately greater than the corresponding changes in the amount of money (including bank deposits).

4. The Meaning of Index Numbers. - It is necessary for the purposes of monetary theory to know what we mean by "price level". If the ratios between prices did not change there would be no problem in measuring changes of price level. Actually, however, the concept can only be defined in terms of an index number. An index number of prices can have only one meaning, namely, the cost of purchasing a particular set of commodities (the quantity of each commodity being specified) at prices prevailing in a particular period of time, relative to the cost of purchasing the same set of commodities at prices prevailing in another specified period of time. The quantities of commodities refer to an arbitrarily chosen base period; depending on the purposes for which the index number is to be used, they may be the quantities consumed, those entering into monetary transactions or some particular class of transactions, or those produced, exported, imported, etcetera, in the base period. In measuring the ratio of change of a particular price level from one period to another we may, for instance, choose either of the two periods as our base. The two methods will give the same result only if the proportions between the relevant quantities of the commodities are the same in both periods. Only if these proportions are the same can a change of the price level be measured accurately, and only if they are approximately the same can an approximate measurement be made. Otherwise the index number will have no significance.

Similar considerations apply to index numbers of what is known as physical volume (a misleading phrase) or quantum (a more satisfactory term). An index number of quantum measures the ratio between the total value of the commodities consumed (or produced, transacted, exported, etc.) at a particular time and the total value of the commodities consumed (etc.) at another specified time, when both sets of commodities are valued at the prices prevailing in an arbitrarily chosen base period. The result depends on the ratios between the prices in the base period chosen in the same way as an index number of prices depends on the ratios between the quantities.

5. Say's Law and Monetary Equilibrium. - According to Say's law, the sale of any given quantity of commodities gives rise to purchasing power which is sufficient to buy any quantity of commodities having a market value equal to the value of those sold. Hence the total income (including profits in income) arising from the sales of all commodities in a unit period is sufficient to pay for the same output of goods at the same prices in the next unit period. If the conditions of monetary equilibrium remain undisturbed and are the same in both periods, the actual amount of money spent on commodities in the second period will equal the income created by the sale of goods in the first period. On the other hand if, during the second period, new money is created (through gold production, printing of paper money, or expansion of bank credit), somebody will have spending power in excess of the income created by the sale of goods during the first period. Similarly, if persons seek to reduce their cash balances in the second period they will, individually, spend more than they earned in the first period, and collectively they will turn over the existing amount of money between themselves at a greater velocity than in the first period. In both cases, expenditure in the second period will exceed

sales in the first period. Correspondingly, destruction of money and/or attempts to increase cash balances will reduce total expenditures. A reduction of total expenditures will reduce production if prices are sticky; otherwise it will merely reduce prices. It follows from the preceding analysis that any attempt to explain depressions as due to reduction of purchasing power is inadequate if it does not explain how a disturbance of monetary equilibrium arises. On the other hand it is possible that a disturbance of monetary equilibrium may result from some change in the conditions affecting supply or demand in the market for a particular commodity, or from a redistribution of income, or some other cause.

6. The Expansion and Contraction of Bank Credit. - When a person pays for a commodity, not with cash, but with a promise to pay, he is thereby enabled, at least temporarily, to spend more than his income without reducing his cash balance. Hence an increase in the use of promises to pay as means of payment tends to increase the velocity of circulation of cash money. If, however, the promises to pay circulate widely and are accepted as equivalent to cash, it is convenient to regard them as a part of money and to describe the phenomenon not as a change in velocity but as a change in the quantity of money. The same phenomenon may be described either way according to the definition chosen for the term "money". When a bank makes a new loan to a customer by creating a deposit in his favor which constitutes a net addition to the total quantity of bank deposits outstanding, this may be regarded either as an increase in the quantity of money including bank deposits, or as a change tending to increase the velocity of circulation of bank reserves.

The possibilities of expansion of bank credit are limited by the amount of available reserves. One bank can not expand credit when others are not expanding without losing some of its reserve. All the banks in a whole country cannot simultaneously expand without reducing their ratio of reserves to deposits, if the quantity of reserves remains constant. Except in times of extreme depression, private banks keep their reserve ratio close to the minimum requirement (which is fixed by law in the United States and by custom in England). Hence in normal times the possibilities of expansion are mainly limited by the possibilities of obtaining additional reserves from the reserve banks or the central bank. In this respect there is a significant degree of elasticity.

7. Bank Credit and Interest Rates - Wicksell's Theory. - The relation between the investment of capital and monetary equilibrium is the central problem of modern monetary theory. Wicksell was the first to point out the main features of this relationship. According to Wicksell there is, at any particular time, a certain rate of interest at which the total quantity of capital demanded for investment will be exactly equal to the total amount of money which persons voluntarily save out of their incomes. This is what Wicksell calls the natural rate of interest. If this interest rate prevails, the amount of capital invested (that is, the amount of money spent on net additions to the stock of capital goods) will equal the amount saved out of incomes. The amount saved is defined as that part of total incomes which is not spent on consumption goods. Hence the equality of the actual and natural rates of interest is a necessary condition of monetary equilibrium. If the banks stand ready to lend at a rate below the natural rate, the total amount that persons will seek to borrow from the banks will exceed the savings entrusted to the banks, an expansion of bank credit will take place, and prices will rise. Similarly if banks charge a rate higher than the natural

rate, bank credit will contract, and prices will fall 1/. If the actual rate of interest is below the natural rate, and prices rise, the resulting improvement in business prospects will make investment more attractive and raise the natural rate. Hence if the actual rate of interest does not rise or does not rise rapidly enough, the inflationary process will continue unchecked. Similarly if the actual rate is below the natural rate, a progressive deflation will take place.

Wicksell's theory of the business cycle follows from his theory of bank credit and the rate of interest. For convenience a state of monetary equilibrium may be assumed to exist at the outset. The growth of population and the making of new inventions, and possibly also some other cause or causes, tend to raise the natural rate of interest. Owing to the element of elasticity in bank credit, the banks are not forced to raise their rates of interest immediately. The inflationary process begins, and the velocity of circulation increases 2/. Then the natural rate of interest rises. The actual rate of interest may (and usually does) rise without rising rapidly enough to check the inflation. The velocity of circulation increases, and this makes further inflation possible even without further expansion of bank credit. Since, however, velocity cannot increase indefinitely and the expansion of bank credit beyond a certain extent is limited by the limitation of reserves, the banks will be forced sooner or later to charge a rate of interest at least as high as the natural rate. This will bring inflation to an end, and the consequent return of velocity to its normal amount will give rise to a deflationary process. The latter will be brought to an end when an excess of reserves induces the banks to lower their rate of interest to the natural level. Other factors modify the process outlined above in various ways.

8. More Recent Theories - Hayek, Keynes and Myrdal. - Hayek's theory is mainly a further development of Wicksell's. Hayek points out that the inflationary process, which causes a larger amount of money to be spent on capital goods than is saved out of income, must therefore also cause a larger proportion of the total amount of resources used to be devoted to the production of capital goods than would be the case in a state of monetary equilibrium. In order to keep these resources in employment at the current rates of pay, the amount of money invested must continue to exceed the amount saved, and the expansion of bank credit must continue 3/. Moreover, the increase of

1/ A qualification is necessary here. If persons are seeking to reduce their cash balances, with the result that velocity of circulation is increasing, and are tending to spend in a given unit period more than their incomes in the preceding unit period, then some contraction of bank credit will be required to offset the increase of velocity if monetary equilibrium is to be maintained. In this case, then, bank credit will contract even if the actual rate of interest is equal to but not greater than the natural rate of interest. In the opposite case, where persons are seeking to enlarge their balances, bank credit will expand if the actual rate equals the natural rate.

2/ It is possible also to assume that at the outset some development, such as a rapid accumulation of capital with a stationary population, reduced the natural rate of interest. In this case the cycle will start with deflation, but the analysis will otherwise be the same.

3/ Temporarily, investment might exceed saving owing to an increase in velocity. In the long run, however, since velocity can not increase indefinitely, a further expansion of bank credit is necessary.

total incomes resulting from inflation increases the amount of additional bank credit required per unit of time to keep the proportion of total expenditure devoted to capital goods at the level to which it has already been raised. Hence, once the process of inflation has started, the employment of resources in the production of capital goods can be maintained only by expanding bank credit at an increasingly rapid pace. Owing to the limitation of bank reserves, this process can be continued beyond a certain limit only with paper-money inflation and if continued must ultimately lead to disastrous consequences. Moreover, the increase in interest rates which results, during inflation, from the prospective further increase of prices, causes capital to be invested in productive processes with a shorter period of production than would be the case if all the capital invested had been saved out of income. This means that the new capital goods are not sufficiently labor saving to be remunerative in the long run. When inflation comes to an end, much of the labor engaged in the production of capital goods during the inflation can no longer be employed and much of the capital equipment produced can no longer be used profitably. A readjustment can come about only through a transference of labor from capital goods production to the production of other goods and through the bankruptcy of firms owning unremunerative capital equipment. This necessarily involves a considerable amount of unemployment while the readjustment is taking place.

Hayek has pointed out that a state of monetary equilibrium involves a progressive reduction of the price level. The accumulation of capital and the development of technique increase the quantum of total production so that increasing quantities of goods are exchanged for the same amount of money. Hence, maintenance of a stable price level would involve inflation and would sooner or later bring about serious maladjustments. Against this point of view it is sometimes argued that Hayek's ideal state of monetary equilibrium is not possible because, with a falling price level, the stickiness of prices would give rise to unemployment and deflation.

Hayek has argued that monetary equilibrium could be maintained by keeping the quantity of money constant. This overlooks the possibility of independent changes of velocity ^{1/}, but is sometimes justified on the alleged ground that changes in velocity are a secondary phenomenon induced by changes in the quantity of money.

Keynes' theory is broadly similar to Wicksell's but differs in important details. Income, in the meaning which Keynes gives to this term, is not equal to the total selling value of commodities, but to their total cost of production, which is the same as the money remuneration of the factors of production plus "the 'normal' remuneration of entrepreneurs." Any excess of total sales value of all commodities sold to the final purchaser above their costs constitutes profits, and any excess of costs above sales value constitutes losses. Monetary equilibrium is that state in which the total sales value of all commodities equals their costs. If selling values exceed costs, and profits appear, there is inflation. This involves an excess of investment over saving, since investment is defined as total selling value of goods less total expenditure on consumption goods, and savings are defined as total incomes less total expenditure on consumption goods. Corresponding statements apply in the case of deflation. To make these definitions exact some further definition of "costs" is required than is given by Keynes, but it is clear that

^{1/} Compare page 19, footnote 1.

some rigidity of the rates of remuneration of the factors of production is implied. Keynes' conception of monetary equilibrium is not identical with those of Wicksell and Hayek, the main difference being due to the peculiar definition of income. In Keynes' theory the criterion of monetary equilibrium is the distribution of income between the entrepreneurs and the factors of production. This criterion throws light on the contribution of sticky costs to the instability of monetary equilibrium. The more costs lag behind in inflation, the greater the tendency to expand production and to increase investment relative to savings, assuming a given rate of interest.

Myrdal's theory differs in significant respects from all preceding theories and contains important contributions. It was implied in Wicksell's theory that those earnings of capital goods which are anticipated by their owners rather than their actual earnings determine the natural rate of interest. An important contribution made by Myrdal is his explicit analysis of the effect of anticipations, which are important even if they are not rational. Myrdal suggests an improvement on Wicksell's comparison of the natural and market rates of interest on the ground this is not a practical tool to use in dealing with actual monetary problems. No means can be devised for finding out the natural rate of interest at any particular time. As for the market rate, there are many different rates for different kinds of credit, and to take this fact into account in theoretical analysis would involve the use of complicated mathematical formulae. In place of the comparison between market and natural rates of interest Myrdal suggests a comparison of the market value of capital goods as expressed in the stock market ^{1/} (A), and their cost of reproduction (B). In a state of monetary equilibrium the difference (A-B) will be large enough to encourage an amount of current investment equal to the amount of saving. If the difference is too large, investment will exceed saving, and inflation will result; if it is too small (or negative), investment will be less than saving and deflation will result. This analysis is shown by Myrdal to be basically the same as that of Wicksell.

Since no account of Myrdal's theory has been published in the English language, it will be described in some detail in class.

9. Cycles in the Replacement of Durable Goods. - The current output of durable goods is normally devoted to two main purposes, namely the replacement of goods currently wearing out and the making of net additions to the total stock of capital goods in use. If replacement were to take place at an even pace, fluctuations in the demand for durable goods would be determined entirely by fluctuations in the demand for net additions to the stock, and these in turn by the various monetary and other factors related to the rate of interest and the investment of capital which have been discussed above. The fact that replacement does not take place evenly introduces a further complicating element which is generally recognized to be of considerable importance in connection with the business cycle. If a particular kind of durable commodity has a normal life in use of ten years, but considerably more than half of the stock in use at a particular time is less than five years old, there will be little need for replacement during the next five years. During the following five-

^{1/} The market value of the stock of a corporation is regarded as the market value of the productive equipment owned by that corporation, which is the same thing as the capitalized value of its future earnings.

year period, however, there will be a large need for replacement. During the third five-year period there will again be a small need for replacement. At a time immediately following a period of rapid expansion in the use of a durable commodity a disproportionate part of the existing stock will be relatively new, and this will give rise to a replacement cycle. Every important kind of durable good has its own replacement cycle, the length of the cycle depending on the usual length of life of the commodity in question. In order to know how replacement cycles influence the general business cycle we must know how they affect monetary equilibrium. First, it will be assumed that goods destined for replacement purposes are paid for with borrowed capital (as is the case with instalment purchasing). Then, in the rising phase of the replacement cycle there will be an increase in the demand for credit. If investment has hitherto been equal to saving there will now be an excess of investment over saving (unless a sufficient increase takes place in the rate of interest) and inflation will be generated. On the downward phase of the replacement cycle the decrease of borrowing for replacement reduces the demand for credit, and the repayment of old credits constitutes an increase of savings. Unless the rate of interest is appropriately reduced, deflation results. It is possible that in extreme cases a reduction of interest rates to zero might not be sufficient to prevent temporary deflation. Hence, reduction of interest rates is not necessarily a practicable remedy. The result is substantially the same when it is assumed that replacement purchases are made as a result of the previous accumulation of a depreciation fund. The accumulation itself constitutes saving, and the use of the accumulated fund to make a replacement purchase constitutes an investment not accompanied by present saving on the part of the person who makes the purchase. It is possible that when a reduction of replacement requirements for an important kind of durable good (or for several kinds at the same time) takes place during a period of rising general business activity, the reduction in the demand for credit may put an end to inflation and cause a turn in the business cycle even though the reserves (and policies) of the banking system permit a further expansion of bank credit.

Other kinds of changes in the demand and supply conditions affecting particular commodities can also influence monetary equilibrium.

VII. THE THEORY OF INTERNATIONAL TRADE AND INTERNATIONAL PAYMENTS.

Time will not permit more than a brief discussion of this subject in the present course.

1. The Theory of Comparative Costs. - Ricardo's theory of comparative costs was intended to indicate: (a) what it is that determines which commodities are exported and imported by a particular country; and (b) the nature of the gain in real income which a country derives from international trade. This theory, however, was based on his labor-cost theory of value, which has long been superseded. Modern reformulations of the doctrine, however, lead to results which are the same on basic points.

2. The Theory of International Payments and International Exchange. - Considerable theoretical work has been done recently on these topics; this will be covered so far as time permits.

LIST OF READINGS

I. INTRODUCTION

Robbins, L. - The Nature and Significance of Economic Science

Robbins is a vigorous advocate of deductive economic theory, for which he claims more than others do who still find it useful.

Fraser, L. M. - How Do We Want Economists To Behave? In Economic Journal, December, 1926.

A criticism of Robbins.

Knight, F. H. - Risk, Uncertainty and Profit, Chapter I, pages 3-21.

Sraffa, P. - The Laws of Return Under Competitive Conditions. In Economic Journal, December 1926.

This article is a landmark in the recent history of economic theory. It points out that the theory of perfect competition is inadequate for the analysis of our present economic system, and a theory of monopolistic competition is required. That the latter has since developed is partly due to the article itself.

II. THE THEORY OF PERFECT COMPETITION

1. The Choice of Resources by an Individual Producer.

Marshall, Alfred - Principles of Economics, pages 355-359 in the 8th edition.

The principle of substitution and its relation to other principles of choice explained.

Black, J. D. - Introduction to Production Economics, pages 275-346.

Explains some of the technicalities, with good illustrative examples.

Robinson, Joan - The Economics of Imperfect Competition, pages 26-34.

Explains some of the geometrical relations between average and marginal curves.

Wicksell, Knüt - Lectures on Political Economy, pages 108-144.

Explains some of the technicalities and also deals with some broader problems relating to the theory of general equilibrium.

Clark, J. M. - The Economics of Overhead Costs, pages 70-134.

Some good illustrative examples of the principle of substitution and the economies of large scale production.

2. The Choice of Commodities by an Individual Consumer and the Theory of Utility.

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The theory of demand in its earlier form.

Hicks, J. R. - A Reconsideration of the Theory of Value. In *Economica*, February 1934, pages 52-60.

The newer theory of demand.

3. The Theory of General Equilibrium.

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4. The Theory of Cost.

Davenport, H. J. - Economics of Enterprise, pages 57-84.

The opportunity-cost theory.

Knight, F. H. - Suggestions for a Simplification of the Theory of Price. In *Journal of Political Economy*, 1928.

Another statement of the same theory.

Marshall, op. cit., pages 140-143 and 331-350.

Marshall conceived of cost as determined fundamentally by the disutility of work, as demand is determined by the utility of consumption. His conception of cost is connected with his views on rent, which, following Ricardo, he does not include in cost.

Clark, op. cit. pages 1-69.

Raises some problems relating to cost which are outside of the theory of perfect competition.

III. THE THEORY OF SHIFTING EQUILIBRIUM IN PARTICULAR MARKETS.

1. Demand for Consumers' Goods.

Schultz, Henry - Statistical Laws of Demand and Supply, pages 3-27.

Hicks, op. cit. pages 61-69.

Working, E. J. - What Do Statistical Demand Curves Show? In Quarterly Journal of Economics, February 1927.

2. Supply, 3. Long and Short Run Equilibrium, 4. Classification of Resources, etc., and 5. External Economies etc.

Viner, Jacob - Cost Curves and Supply Curves. In Zeitschrift fuer Nationaloekonomie, 1931 (3 photostat copies of this article, which is in English, are in the Graduate School collection).

Explains the relations of cost-curves and supply curves.

Marshall, op. cit., pages 150-172 and 413-439.

Explains the Ricardian theory of rent and Marshall's concept of quasi-rent which is derived from it. Marshall's view that diminishing returns in agriculture have a different significance from diminishing returns in the generalized sense is no longer widely accepted. Read carefully the note on pages 169-172 and the footnote on pages 436 and 437. "Rent" in modern economics is payment for the use of a resource which is specialized to one industry. "Quasi-rent" may be regarded as payment for a resource which is temporarily specialized. Marshall, however, would have said "limited in quantity" instead of "specialized". The two concepts have this in common, that if all of a resource is used in one industry, that industry cannot obtain more from other industries.

Robinson, op. cit. pages 102-129.

A discussion of the rent problem followed by an analysis of the supply curve similar to Viner's.

6. Demand For Producers' Goods etc.

Marshall, op. cit. pages 381-393.

The theory of joint supply and joint demand analysed

subject to the limiting assumption that the proportions between the products or resources in question are fixed.

Robinson, op. cit. pages 235-256.

Considers the demand for a resource when the proportions are variable.

Kreps, T. J. - Joint Costs in the Chemical Industry. In Quarterly Journal of Economics, May 1930.

Contains some interesting illustrative material.

8. Theory of Equilibrium in the Case of Related Commodities.

Ezekiel, M. J. B. - Certain Aspects of the Demand for Competing Commodities. In Econometrica, April 1933.

IV. THE THEORY OF ECONOMIC GROWTH.

Wicksell, op. cit. pages 144-257.

Knight, F. H. - Professor Fisher's Interest Theory: A case in point. In Journal of Political Economy, April 1931.

V. MONOPOLY AND MONOPOLISTIC COMPETITION

Robinson, op. cit.

Chamberlin, E. H. - The Theory of Monopolistic Competition.

This is included as optional reading. The student should first become familiar with the contents of Joan Robinson's book.

Harrod, R. F. - Doctrines of Imperfect Competition. In Quarterly Journal of Economics.

VI. MONETARY AND BUSINESS CYCLE THEORY, ETC.

Wicksell, op. cit., Volume II.

Not yet translated into English. Students who know German should read pages 1-30, 67-82 and 144-259 of the German translation.

Keynes, J. M. - A Treatise on Money, Vol. I pages 53-325 and Vol. II pages 164-170, 198-210 and 339-387.

Hayek, F. A. - Prices and Production.

Myrdal, Gunar - Der Gleichgewichtsbegriff als Instrument der
Geldtheoretischen analyse. In: Beitræge zur Geldtheorie
(edited by F. A. Hayek).

Students who know German should not fail to read this.

Kuznets, Simon - Equilibrium Economics and Business Cycle Theory. In
Quarterly Journal of Economics May 1930.

Clark, J. M. - Strategic Factors in Business Cycles.

Discusses the replacement cycle.

VII. THE THEORY OF INTERNATIONAL TRADE

Harrod, R. F. - International Economics.

